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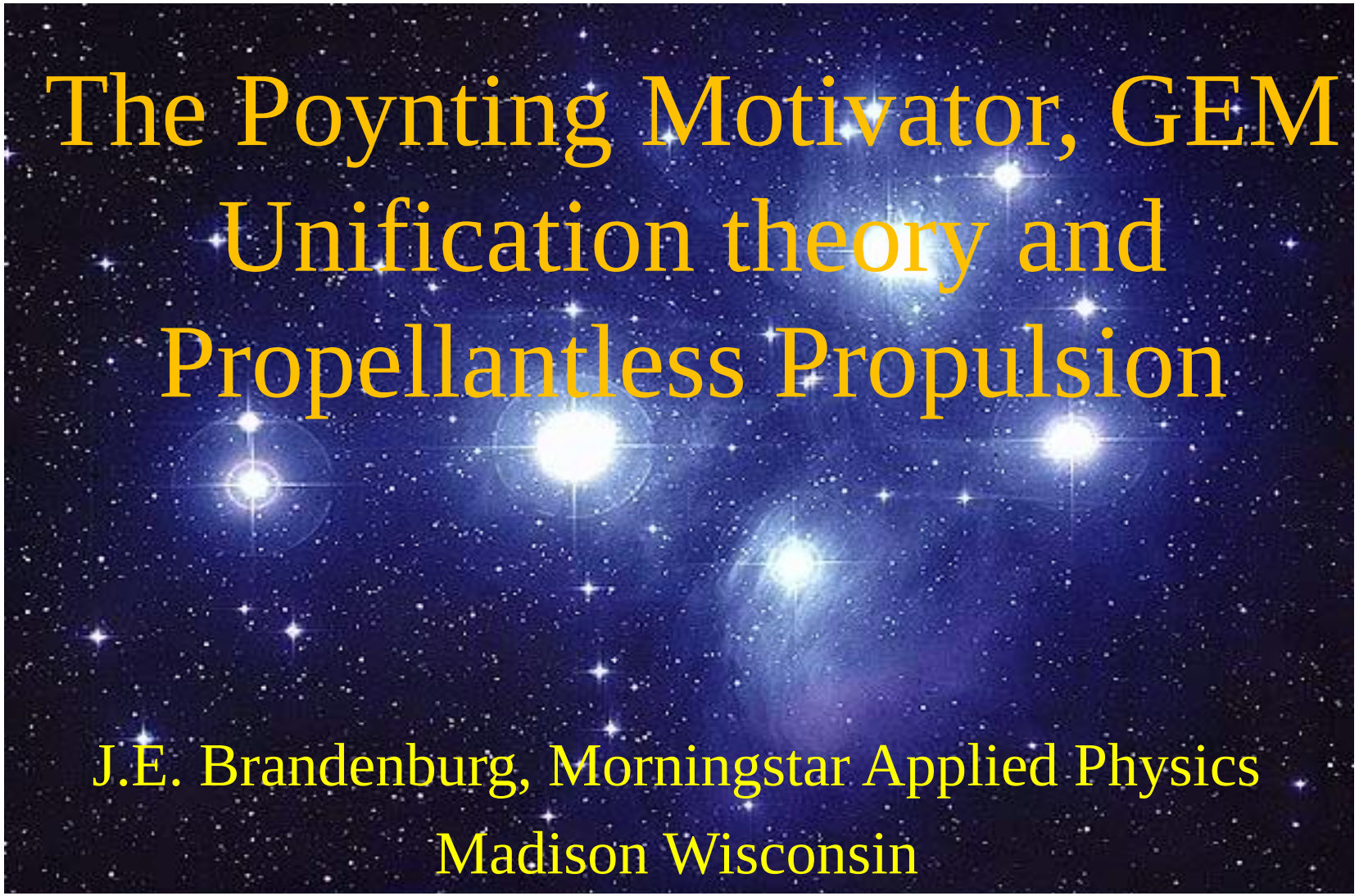

The Poynting Motivator, GEM Unification theory and Propellantless Propulsion

J.E. Brandenburg, Morningstar Applied Physics
Madison Wisconsin

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Agenda

- The Goal of Practical Feild Unification
- Dirac and Cosmic Evidence of Unification
- The Poynting Vector and Gravity
- The Quantum Vacuum
- The GEM Theory
- The Poynting Motivator – Coupling to the Vacuum
- Discussion and Summary

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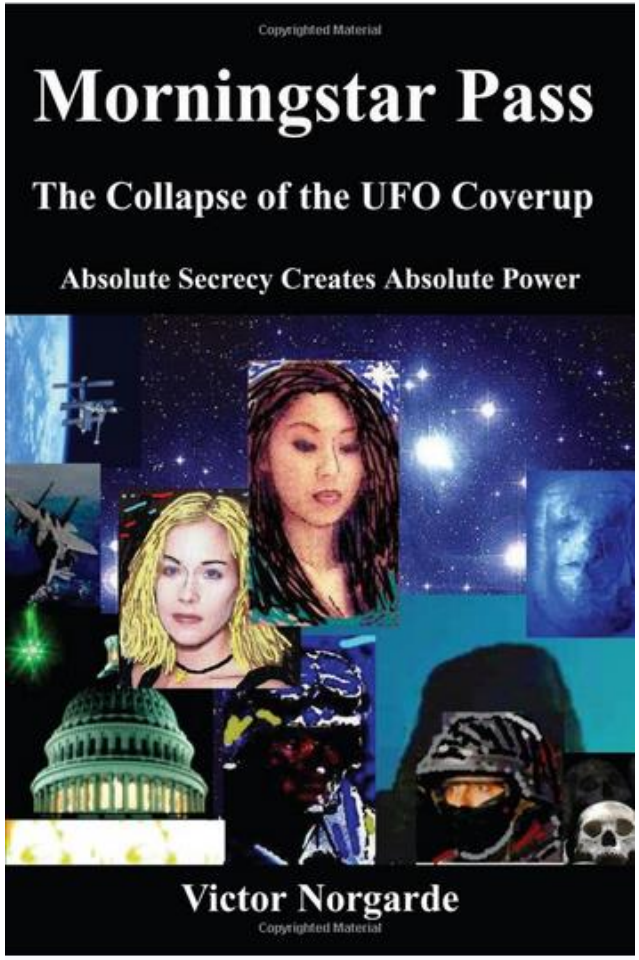
My Science Fiction



"Prequel" to Morningstar Pass

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Our goal : Propulsion by Manipulation of Spacetime

Scotty! More anti-matter!

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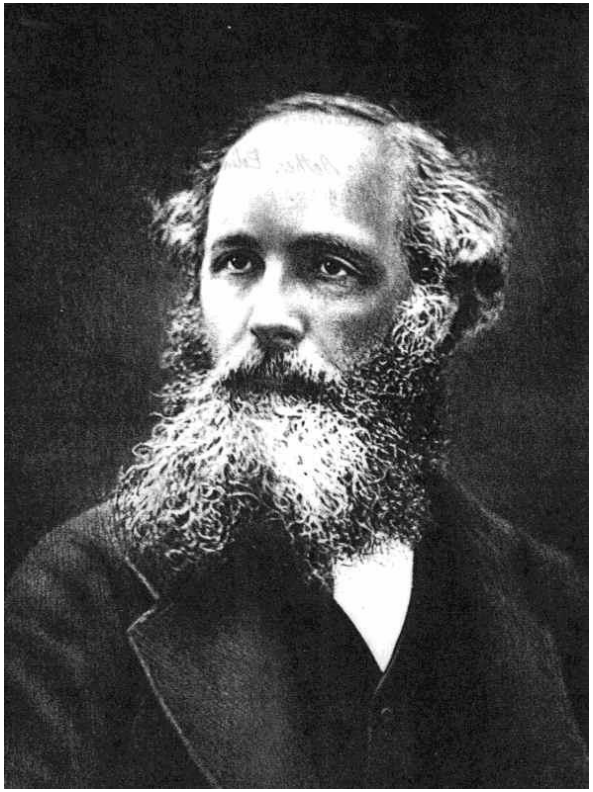
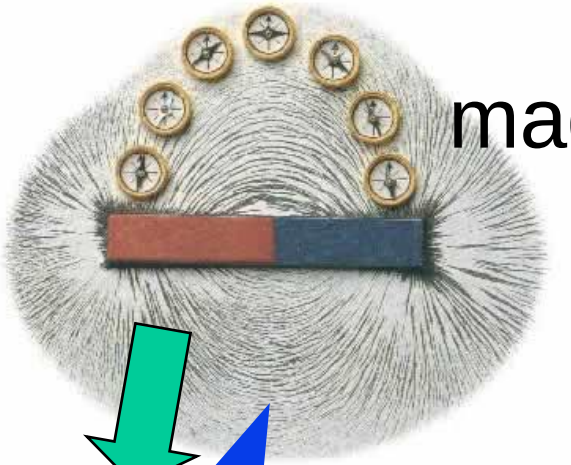
James Clerk Maxwell



The ***"Great Unifier"***

Electricity-Magnetism Unification (1861)

electricity



magnetism

light

EM Theory

NOW

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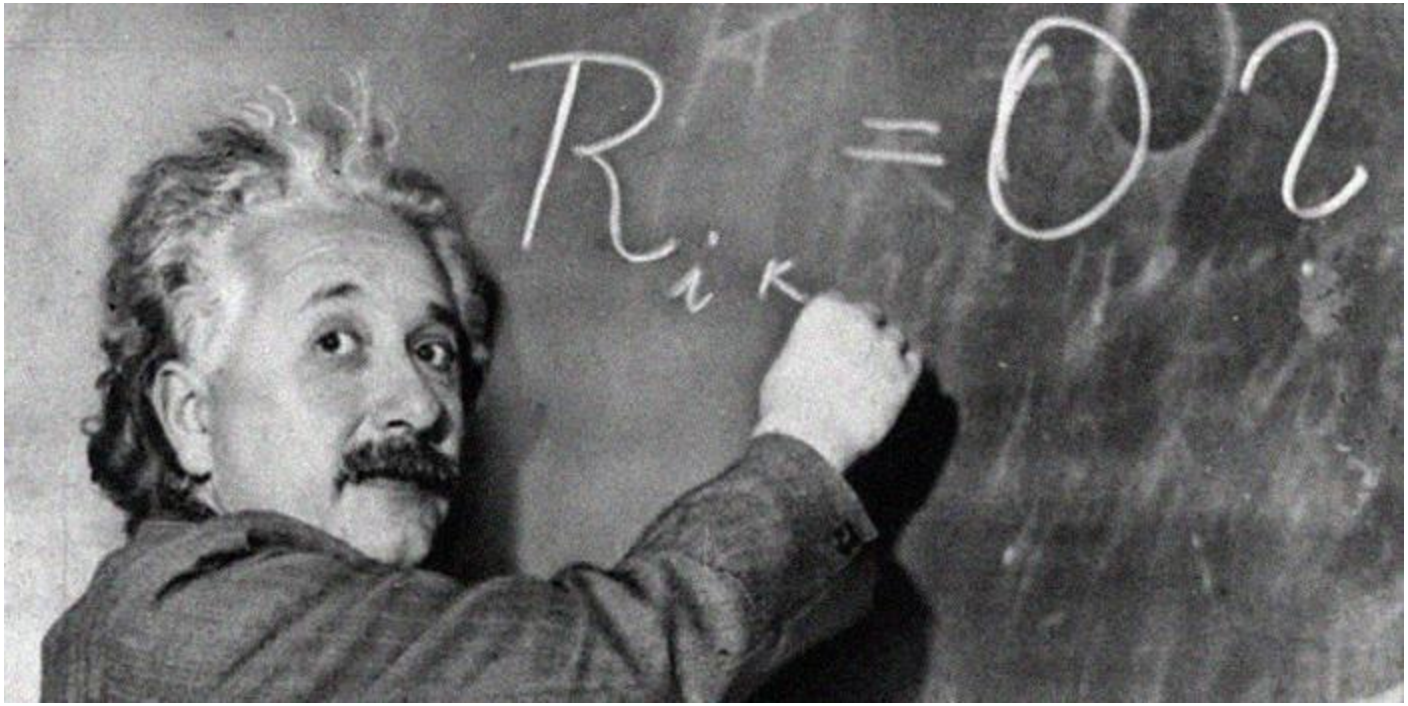
Einstein Sought Gravity-EM Unification



Goal: find the EM structure of spacetime- ***and alter it!***

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Big Question:

Was Einstein partly right? :

Can one unify EM and Gravitation, both long range forces without explicit mention of the Weak and Strong Forces?

Using Quantum theory of the Vacuum ?

(Which Einstein rejected)

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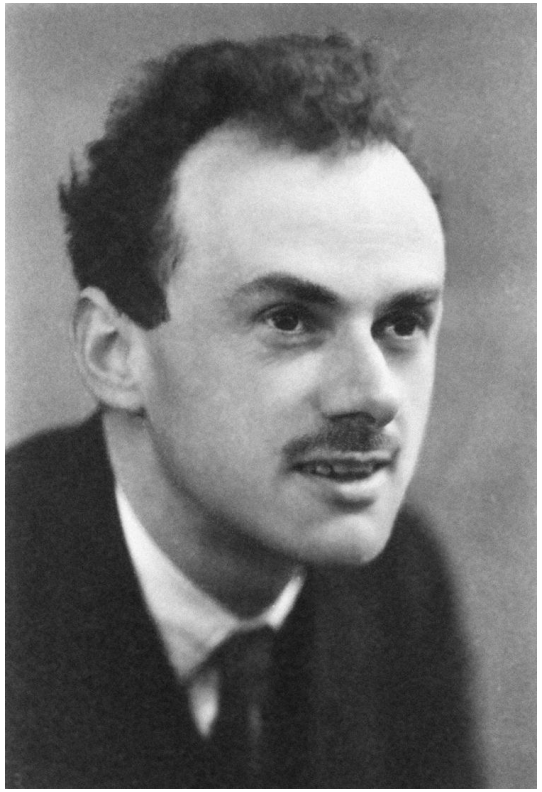
Dirac's BIG Discovery



$$\frac{4\pi\varepsilon_o G m_p m_e}{e^2} \cong \frac{r_c}{R_H}$$

$$\frac{e^2}{4\pi\varepsilon_o m_e c^2} = r_c$$

Electron classical radius

R_H *is the Hubble Radius*

But what does it mean?

Condition of critically open cosmos:

$$\Omega = \frac{8\pi G m_p n R_H^2}{3c^2} \cong 1$$

Condition of critical optical depth

$$\cong \sigma_{Th} n R_H = \frac{8\pi n r_c^2 R_H}{3} \cong 1$$

$$\frac{e^2}{4\pi\varepsilon_o m_e c^2} = r_c$$ Electron classical radius

Dirac Condition

$$\frac{4\pi\varepsilon_o G m_p m_e}{e^2} \cong \frac{r_c}{R_H}$$

(Brandenburg 1992)

Optically Thick

Optically Critical

Optically Thin

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Physical Meaning of Dirac Condition?

Gravity Coupling of the particles in the universe is correlated to their EM Coupling with each other by radiation

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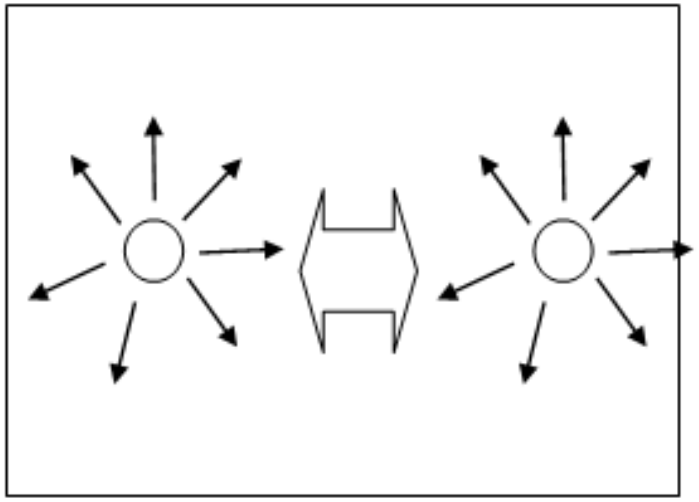
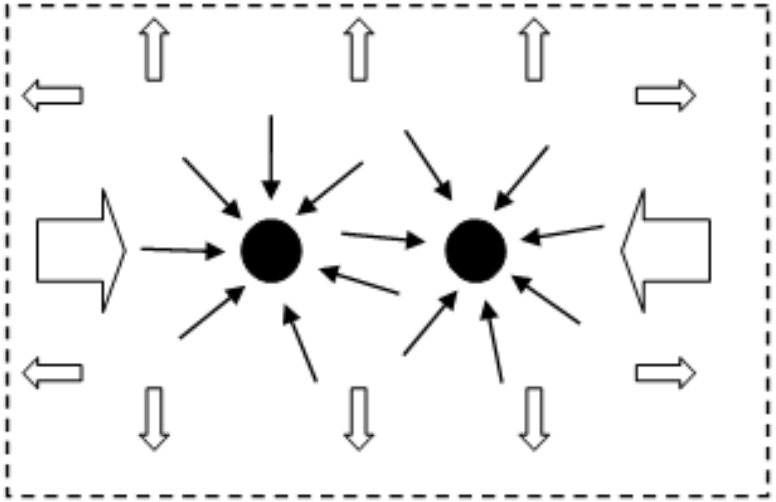
Sakharov's Unification Model

Gravity as ZPF (Zero Point Fluctuation)
Radiation Pressure



TWO BRIGHT OBJECTS IN DARK BOX REPEL EACH OTHER



TWO DARK OBJECTS IN A BRIGHT BOX ATTRACT EACH OTHER

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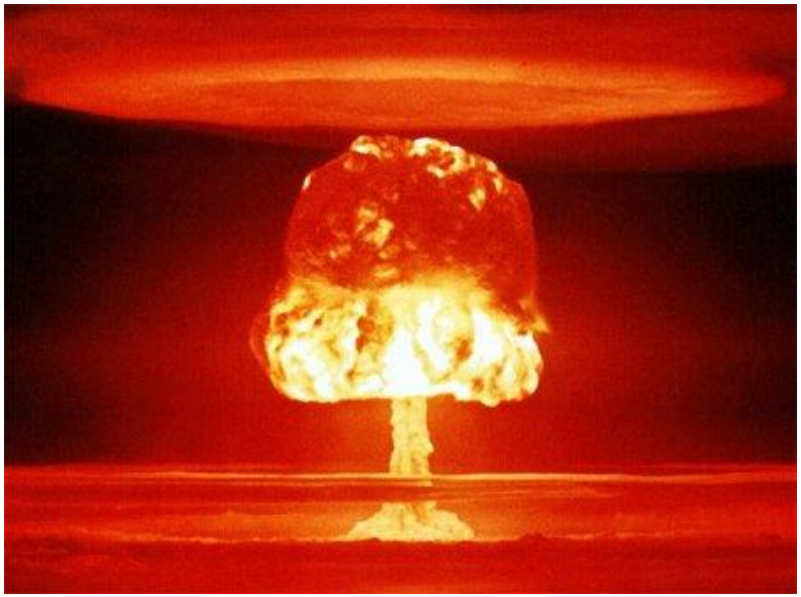
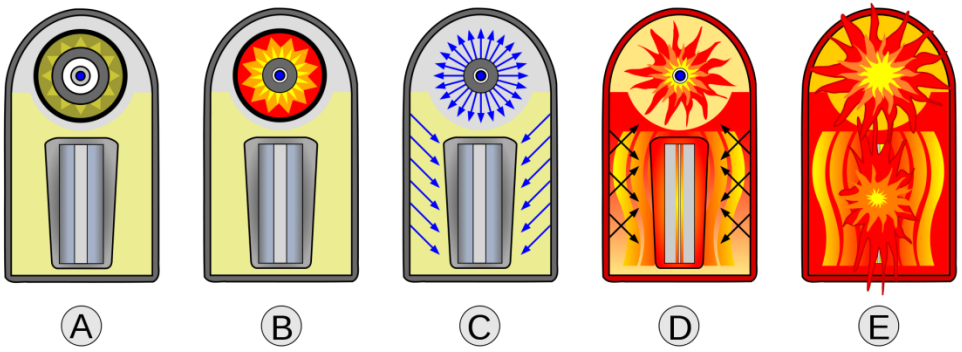
Source of Sakharov's Model





Hydrogen Bomb
Operates on Radiation
Pressure

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Hilbert Action Principle

- General Relativity for a vacuum can be derived from spacetime energy minimization

$$W = \int \frac{R}{16\pi G} dx^4$$

$$\delta W = 0$$

$$R_{\mu\nu} + \frac{1}{2} g_{\mu\nu} R = 0$$

Sakharov used this concept

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Sakharov's Formula for G

$$G \cong \frac{c^5}{\int_0^{\omega_P} \hbar\omega d\omega} = \frac{c^3 r_p^2}{\hbar}$$

"Big G from ZPF"

$$r_p = \sqrt{\frac{G\hbar}{c^3}}$$ Planck Length

GRAVITY FIELDS ARE QUANTUM EM

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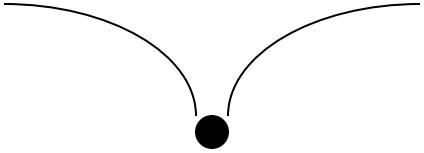
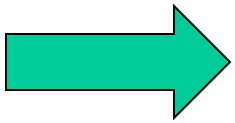
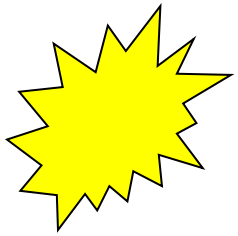
t'Hooft Derivation of Newton Gravitation Constant



Black Hole –pure gravity



Hawking Decay



Pure thermal EM

$$Gm_e^2 \cong (\alpha\sqrt{2})^{-1} e^{-\pi/4\alpha} (?),$$

A PHYSICAL INTERPRETATION OF GRAVITATIONAL INSTANTONS

G. 't HOOFT

Nuclear Physics B315 (1989) 517–527
North-Holland, Amsterdam

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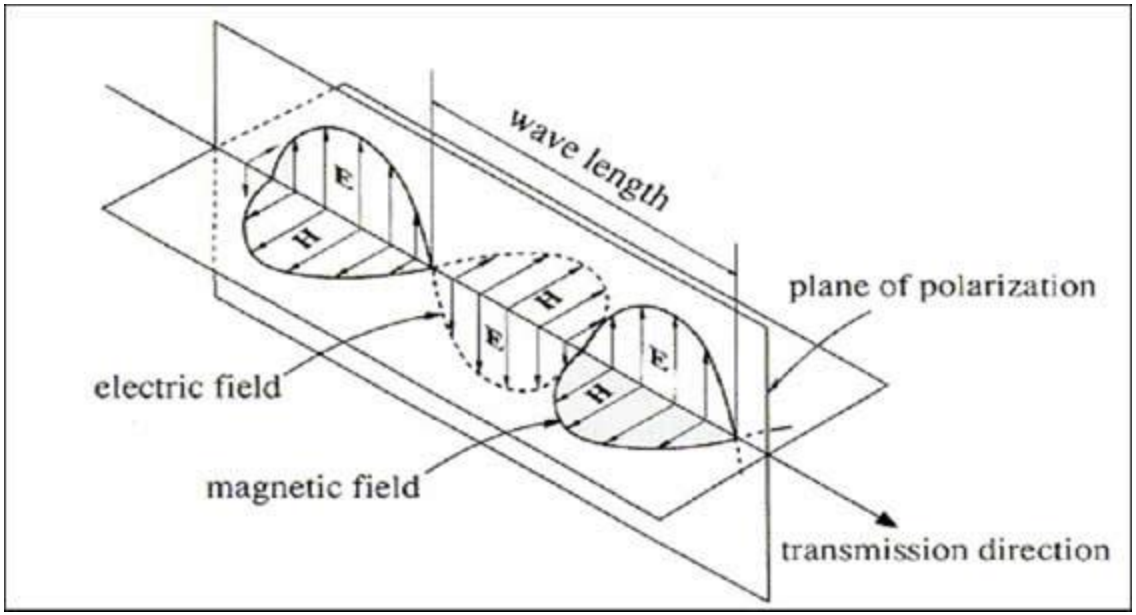
Common Concept among ideas

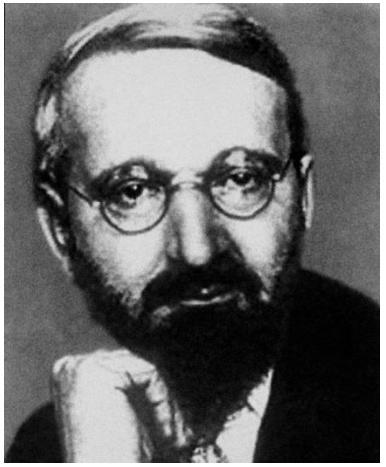
Gravity vector is connected to the EM Poynting vector



$$\vec{S} = \frac{\vec{E} x \vec{B}}{\mu_o}$$

Kaluza-Klein Theory

- Add a compact 5^{th} dimension to the Hilbert Action principle
- Obtain General Relativity Plus Maxwell's equations



Theodor Kaluza and Oskar Klein

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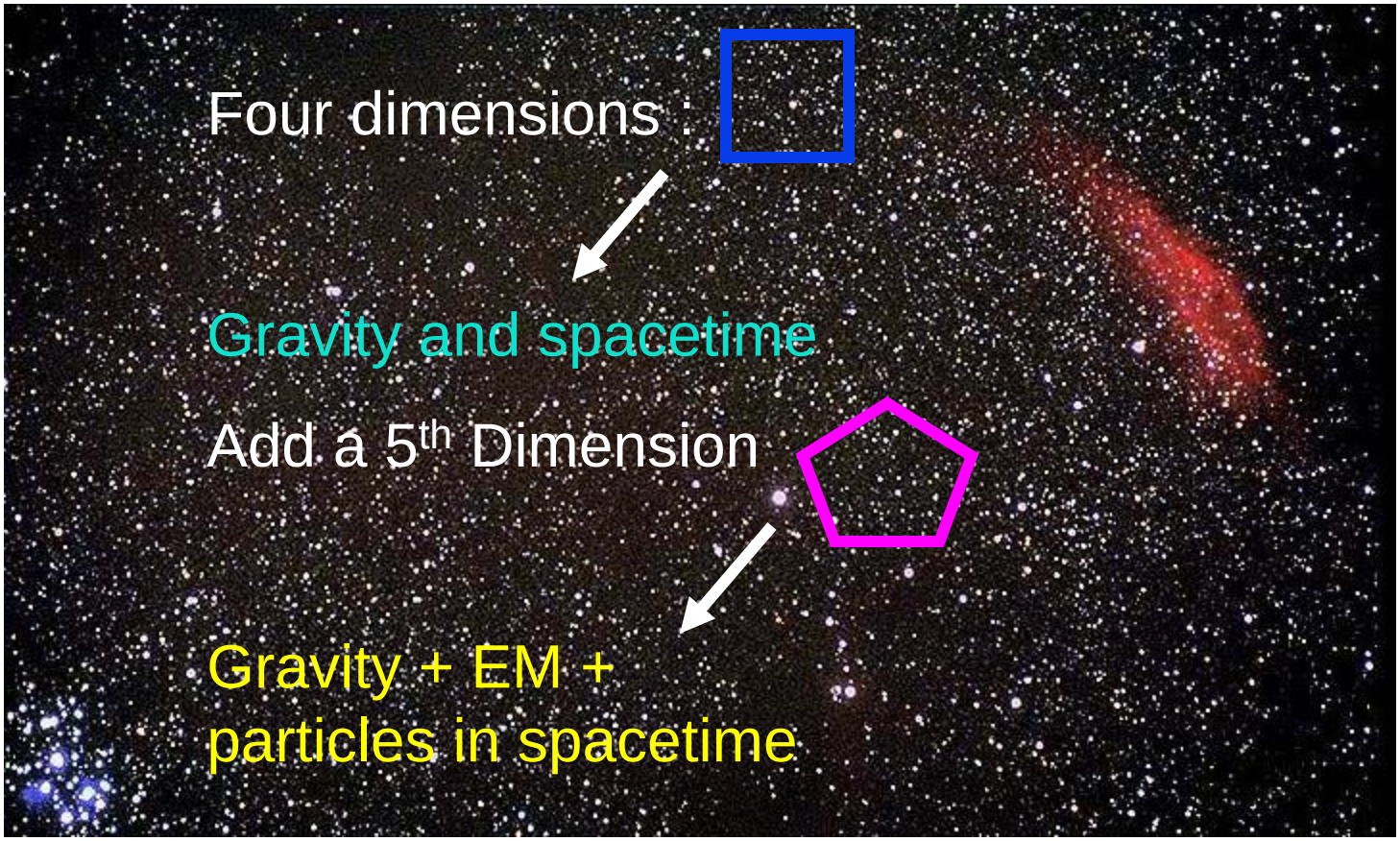
Kaluza-Klein Theory (1929)



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Kaluza Klein Action principle

$$W = \int K dx^4$$

$$\delta W = 0$$

New Term

$$K = \frac{R}{16\pi G} - \frac{F_{\mu\gamma} F^{\mu\gamma}}{4}$$

Introduction To GEM Theory

- GEM (Gravity-Electro-Magnetism)or (Grandis et Medianis)) the “great and the middle” scales
- GEM is an alloy of Sahkarov -ZPF (Zero Point Fluctuation)), and Kaluza Klein (5^{th} Dimensional) approachs to EM-gravity unification

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Planck's Constant and Quantum mechanics

- Planck scale is length where spacetime is a foam of quantum black holes appearing and annihilating each other because of Heisenberg Uncertainty:

  r_P= 1.6 x 10^{-33} cm

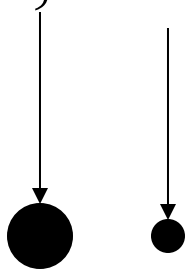
  Mass= 2.1x10^{-8} kg

$$r_P = \sqrt{\frac{G\hbar}{c^3}}$$

- EM turbulence caused by this Hiesenberg Uncertainty gives rise to ZPF of EM fields

The Cosmos as it is

- Cosmos is 99.9% hydrogen (protons and electrons)
- It has a heavy particle, a proton, and lighter one, electron (yin and yang?)
- It has two long range forces: weak one-gravity and strong one-EM $\frac{Gm_p m_e}{e^2} = 4x10^{-40}$
- Gravity satisfies equivalence, EM doesn't



The Mesoscale

- Mesoscale is the scale of ordinary subatomic particles and their scale lengths.
  - masses: ~ m_p, m_e ,
  - lengths : ~ $r_c = e^2/(m_e c^2)$
- Mesoscale is between Planck scale and Cosmic scale in length
- Mesoscale below Planck scale in mass

The GEM Theory (1986)

- Two Postulates:
  - Gravity is an array of Poynting vectors (ExB drifts)
  - Both EM- gravity and protons and electrons appear from the Planck scale with the appearance of a 5^{th} dimensional hidden dimension

GEM Theory combines Sakharov and Kaluza-Klein Theories

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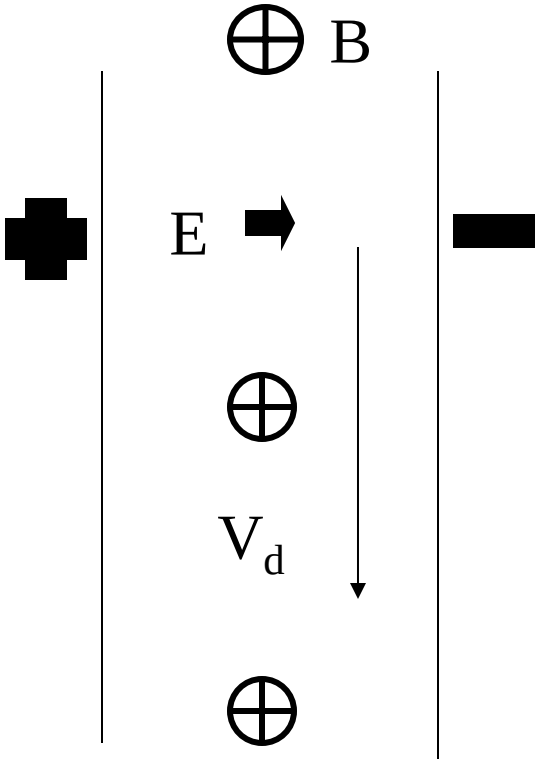
A Model for Gravity fields in terms of E and B fields

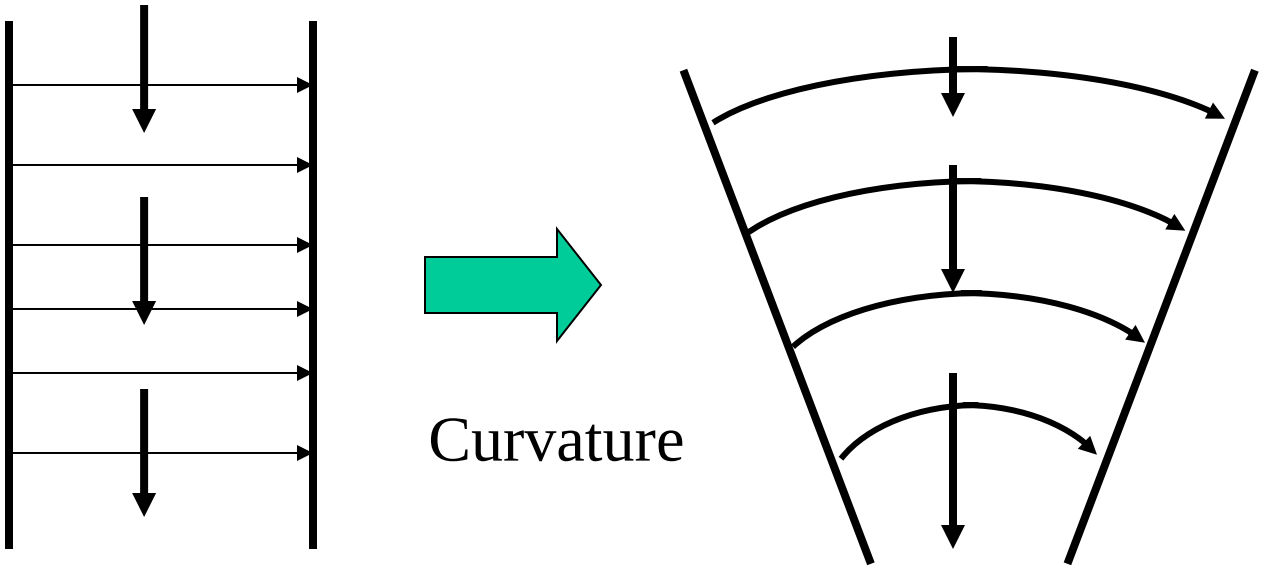
$$V_D = \frac{(\vec{E}x\vec{B})}{B^2} = \frac{\mu_o \vec{S}}{B^2}$$

$$g = \dot{E}\, xB_o c \Big/ B_o^{\,2}$$



ExB drift effects all particles regardless of mass or charge, satisfies equivalence principle

ExB drift Gravity Cont.



Uniform motion

Acceleration

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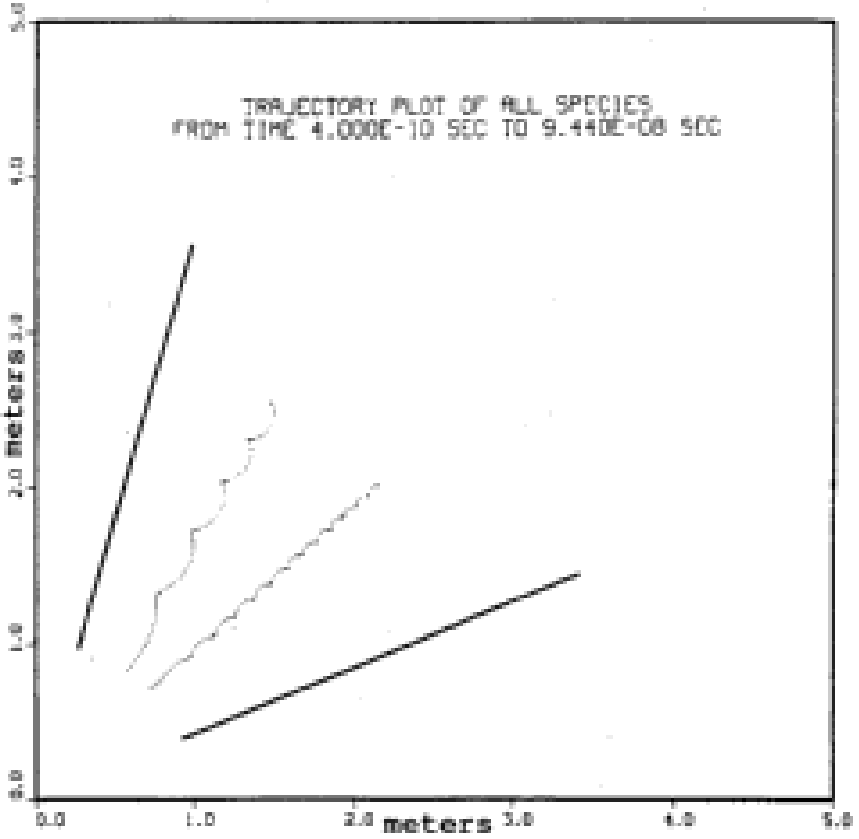
ExB drift Gravity Cont.



We have model of gravity field as EM for "free particles"

Simulation using EM PIC code

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Vacuum mass

$$g_{\alpha\beta} = \frac{4F_{\alpha}^{\gamma}F_{\gamma\beta}}{F_{\mu\gamma}F^{\mu\gamma}}$$

$$T_{\alpha\beta} = F_{\alpha}^{\gamma}F_{\gamma\beta} - g_{\alpha\beta}\frac{F_{\mu\gamma}F^{\mu\gamma}}{4} = 0$$

The Vacuum Weighs Nothing!!!!!!

But is full of energy!

GEM Metric Tensor

$$g_{\alpha\beta} = \frac{4F_{\alpha}^{\gamma}F_{\gamma\beta}}{F_{\mu\gamma}F^{\mu\gamma}} = \left[B^2 - E^2\right]^{-1} \begin{pmatrix} -E^2 & S_x & S_y & S_z \\ S_x & E_x^2 - B_y^2 - B_z^2 & & \\ S_y & & E_y^2 - B_x^2 - B_z^2 & \\ S_z & & & E_z^2 - B_y^2 - B_x^2 \end{pmatrix}$$

$$S = ExBc$$

Size of Hidden Dimension

$$\phi_o(\eta) = \ln(\ln(r_c(\xi)/r_P))$$

$$\left(\frac{m_p}{m_e}\right)^{1/2} = \ln\left(r_o/r_P\right) = 42.8503...$$

The postulate that the separation of proton-electron pair into distinct particles is correlated to the separation of gravity and EM forces- leads to relation of mass ratio to ratio of strengths

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Vacuum Bernoulli Equation

Kaluza Klien Action

$$K = \frac{R}{16\pi G} - \frac{F_{\mu\gamma}F^{\mu\gamma}}{4} \Rightarrow \frac{g^2}{2\pi G} - \frac{S}{U_o}^2$$

$$U_o = \frac{(B^2 - E^2)}{8\pi}$$

$$\frac{g^2}{2\pi G} - \frac{S^2}{U} = K \quad Vacuum \quad Bernoulli \quad Equation$$

Direct coupling between EM and gravity fields

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GEM Results

#1 $\frac{g^2}{2\pi G} - \frac{S^2}{U} = K$ *Vacuum Bernoulli Equation*

Direct coupling between EM and gravity fields

#2 $\ln\left[\frac{r_o}{r_P}\right] = \left[\frac{m_p}{m_e}\right]^{1/2} = 42.8503...$

Mass formula leads to formula for ”big G”

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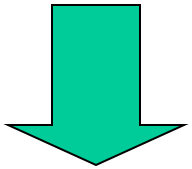
Theoretical formula for G

$$G = \frac{e^2}{4\pi\varepsilon_o m_p m_e}\alpha\left[\frac{r_p}{r_o}\right]^2$$



$$G = \frac{e^2}{4\pi\varepsilon_o m_p m_e}\alpha\exp(-2\left[\frac{m_p}{m_e}\right]^{1/2}) = 6.668x10^{-11}N - m^2/kg^2$$

Inversion of log formula leads to formula for "big G" (in MKS)

Accepted value:

$$G = 6.673x10^{-11}m^3kg^{-1}\sec^{-2} \pm 1.5 \quad parts \quad per \quad thousand\,(CODATA)$$

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Theoretical Versus Accepted

Value for  *Go Packers!!!*

$$G = 6.673x10^{-11} m^3 kg^{-1} \sec^{-2} \pm 1.5 \quad parts \quad per \quad thousand\,(CODATA)$$

$$\frac{G_{\exp} - G_{theory}}{G_{\exp}} = \frac{6.673x10^{-11} - 6.6680x10^{-11}}{6.6.73x10^{-11}} = .0007439 = 0.7x10^{-3} error$$

Formula for G is within experimental error to accepted value

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Vacuum Hall Effect

GEM theory predicts Poynting flows can couple to vacuum “Virtual Plasma”

Momentum conservation happens through gravity coupling of vaccum to nearby large masses

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Parallel Universes Theory (2014)

New formulation of Quantum Mechanics

Vacuum consists of multiple-coexisting ‘spaces’ some just after their own “Big Bang” and ***thus full of plasma***

Theory allows propulsion Poynting fields to tunnel to parallel universe full of plasma and reaction fields to tunnel back allowing coupling to “vacuum”

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SUMMARY

- GEM theory is combination of Sakharov and Kaluza-Klein
- GEM theory is covariant
  - Metric tensor is normalized EM stress tensor
  - Gravity vector associated with Poynting Vector
  - ZPF mass vanishes but fields do not
- Accurate formula for  is found
- "Vacuum Hall Effect" is predicted in GEM theory making "propellant-less" propulsion possible.

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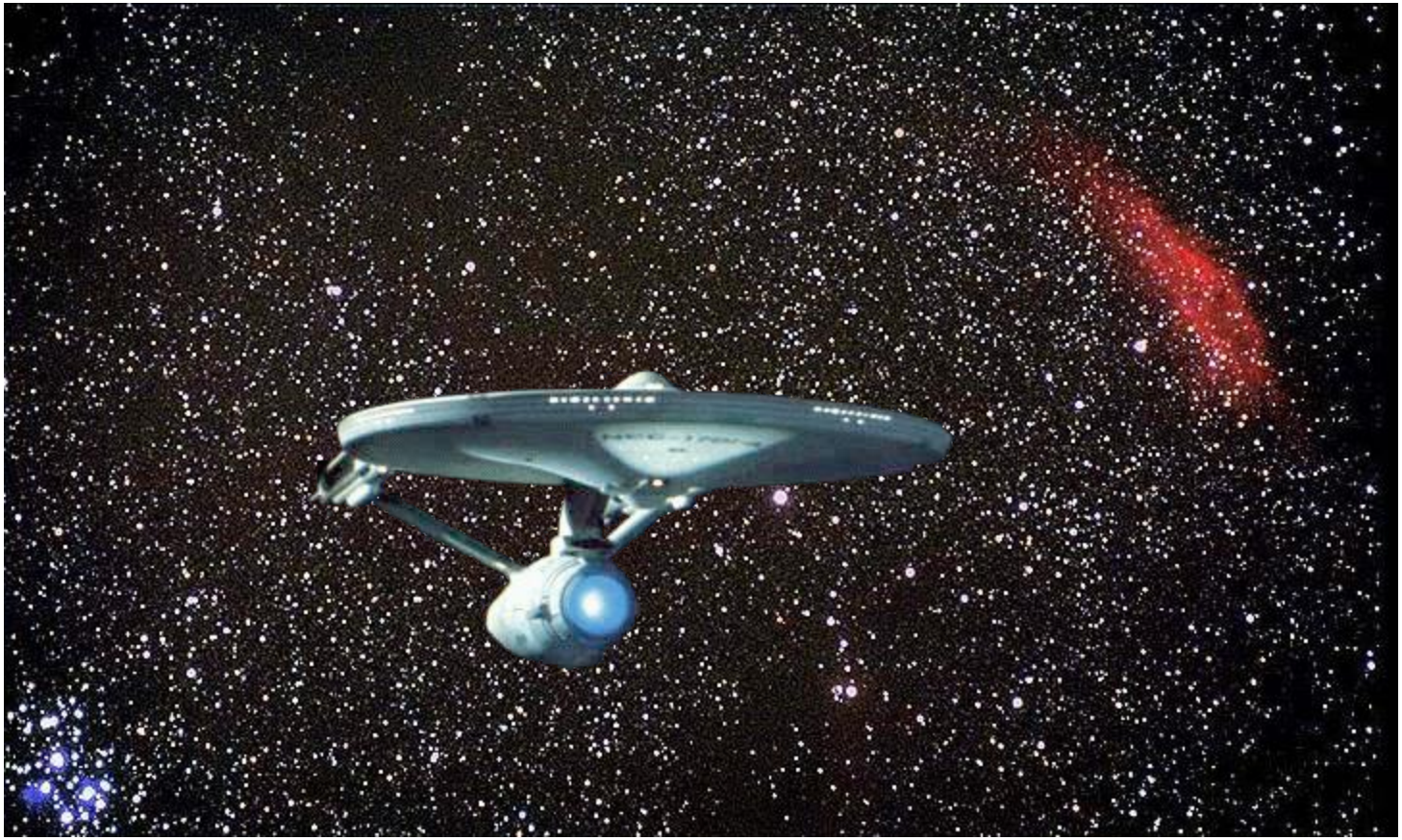
There is no “Box”



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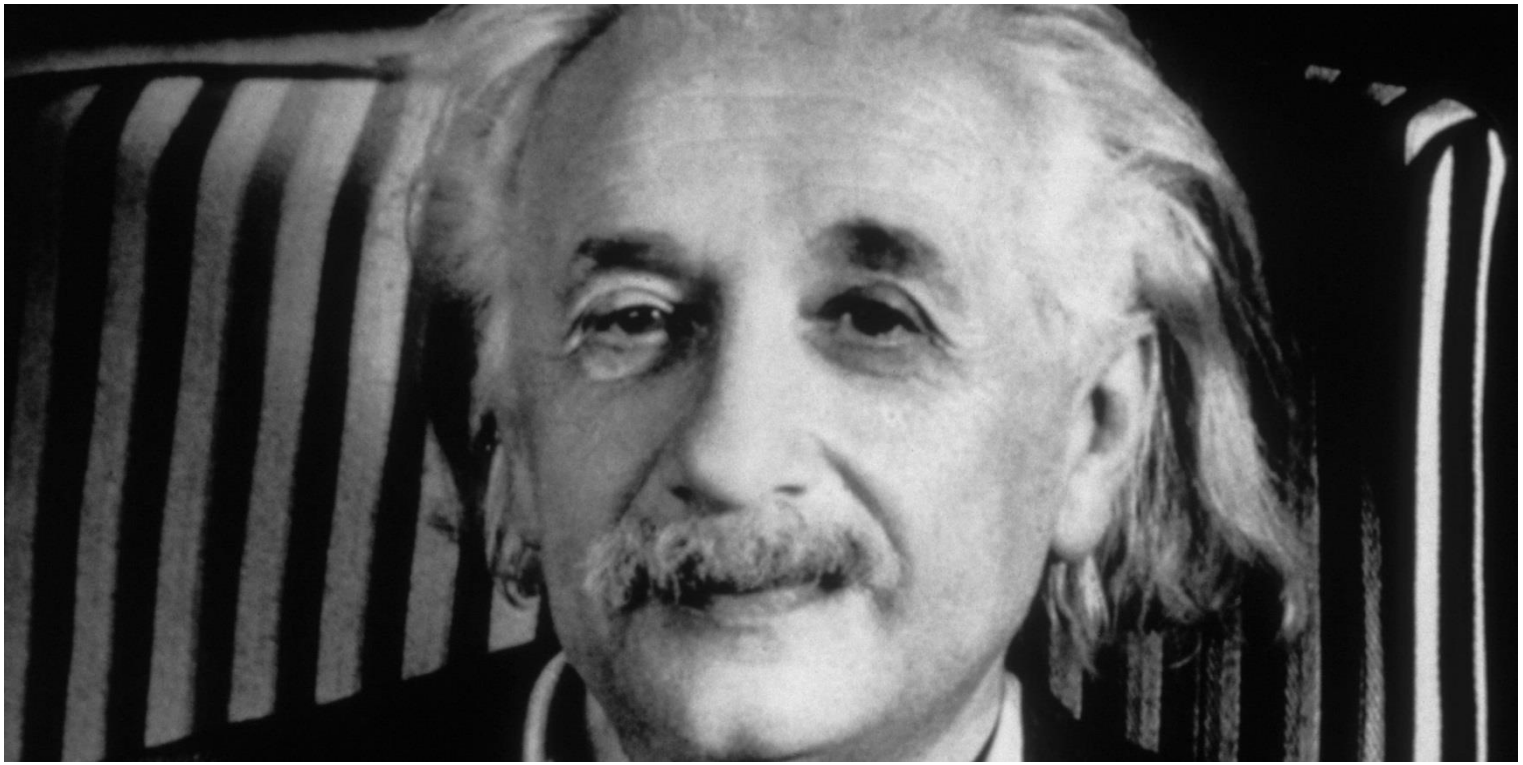

I told you so!